



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION AND INDOOR AIR

National Air and Radiation Environmental Laboratory
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EPA Region 5 Records Ctr.



232874

July 16, 2004

MEMORANDUM

SUBJECT: Radiochemical Results for
Lindsay Light II-Lake Shore East Samples

FROM: *JG* John Griggs, Chief *Aug 13, H.H.*
Monitoring and Analytical Services Branch

TO: Fred Micke, On-Scene Coordinator
Region 5

Attached are data packages for gamma analysis of samples collected from the Lindsay Light Site, Lake Shore East in Chicago, IL. The sample constitutes NAREL batch numbers 0400031 and 0400032.

Radiochemical analyses usually require the subtraction of an instrument background measurement from a gross sample measurement. Both values are positive, but when the sample activity is low, random variations in the two measurements can cause the gross value to be less than the background, resulting in a measured activity less than zero. Although negative activities have no physical significance, they do have statistical significance, as for example in the evaluation of trends or the comparison of two groups of samples.

For all analyses except gamma spectroscopy, it is the policy of NAREL to report results as generated, whether positive, negative, or zero, together with the 2-sigma measurement uncertainty and a sample-specific estimate of the minimum detectable concentration (MDC). The activity, uncertainty, and MDC are given in the same units. The activity and 2-sigma uncertainty for a radionuclide measured by gamma spectroscopy are reported only if the nuclide is detected; so, the results of gamma analyses are never zero or negative. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226, and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected," or "ND," and provides a sample-specific estimate of the MDC.

Specific information concerning all aspects of the radiological analysis of the samples is contained in the batch case narratives of the data packages. If you have any questions concerning the analytical results, please contact me at (334)270-3450.

Attachments

cc: Jack Barnette, Region 5, w/o attachments
 Steve Ostrodka, SF, Region 5, w/o attachments
 Mary Clark, (6601J), w/o attachments
 Ed Sensintaffar, NAREL

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0400031

Project: LINDSAY LIGHT II
 Analysis Procedure: Gamma Spectrometry
 Date Reported: 06/30/2004

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A4.02877K	28A	SAM	SOIL	12/23/2002	06/10/2004
A4.02878L	26CD	SAM	SOIL	12/23/2002	06/10/2004
A4.02879M	35B36A	SAM	SOIL	12/23/2002	06/10/2004
A4.02880E	E-F.5/13-19	SAM	SOIL	01/27/2003	06/10/2004
A4.02881F	I-N/13-19	SAM	SOIL	01/27/2003	06/10/2004
A4.02882G	S-9 WEST	SAM	SOIL	01/27/2003	06/10/2004
A4.02883H	S-9 EAST	SAM	SOIL	01/27/2003	06/10/2004
A4.02884J	10A	SAM	SOIL	02/05/2003	06/10/2004
A4.02885K	29C	SAM	SOIL	02/05/2003	06/10/2004
A4.02886L	11A10B WEST	SAM	SOIL	02/05/2003	06/10/2004
A4.02887M	11A10B EAST	SAM	SOIL	02/11/2003	06/10/2004
A4.02888N	7C	SAM	SOIL	03/06/2003	06/10/2004
A4.02889P	9A#1	SAM	SOIL	03/27/2003	06/10/2004
A4.02890G	9A#2	SAM	SOIL	03/27/2003	06/10/2004
A4.02891H	9B	SAM	SOIL	03/27/2003	06/10/2004
A4.02892J	36A	SAM	SOIL	03/27/2003	06/10/2004
A4.02893K	9C	SAM	SOIL	04/04/2003	06/10/2004
A4.02894L	10C	SAM	SOIL	04/04/2003	06/10/2004
A4.02895M	10D#1	SAM	SOIL	04/04/2003	06/10/2004
A4.02896N	10D#3	SAM	SOIL	04/04/2003	06/10/2004

EXCEPTIONS

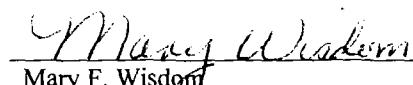
1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

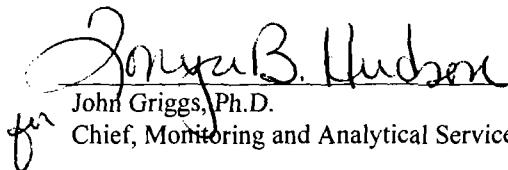
I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.



7/16/04
Date

Mary F. Wisdom

Quality Assurance Coordinator



JG

7/16/04
Date

John Griggs, Ph.D.

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400031**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
 Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A4.02877K		N/A	06/23/2004	0008730P	0003230R
A4.02878L		N/A	06/23/2004	0008730P	0003230R
A4.02879M		N/A	06/23/2004	0008730P	0003230R
A4.02880E		N/A	06/23/2004	0008730P	0003230R
A4.02880E	DUP	N/A	06/24/2004	0008730P	0003230R
A4.02881F		N/A	06/23/2004	0008730P	0003230R
A4.02882G		N/A	06/23/2004	0008730P	0003230R
A4.02883H		N/A	06/23/2004	0008730P	0003230R
A4.02884J		N/A	06/23/2004	0008730P	0003230R
A4.02885K		N/A	06/23/2004	0008734U	0003230R
A4.02886L		N/A	06/24/2004	0008734U	0003230R
A4.02887M		N/A	06/23/2004	0008734U	0003230R
A4.02888N		N/A	06/23/2004	0008734U	0003230R
A4.02889P		N/A	06/24/2004	0008734U	0003230R
A4.02890G		N/A	06/24/2004	0008734U	0003230R
A4.02891H		N/A	06/24/2004	0008734U	0003230R
A4.02892J		N/A	06/24/2004	0008734U	0003230R
A4.02893K		N/A	06/24/2004	0008738Y	0003230R
A4.02894L		N/A	06/25/2004	0008738Y	0003230R
A4.02895M		N/A	06/25/2004	0008738Y	0003230R
A4.02896N		N/A	06/25/2004	0008738Y	0003230R

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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GAMMA ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02877K	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008730P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.900e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/22/2004 14:34	1000.0	GE01	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND			PCI/GDRY	12/23/2002
Bi214 *	3.15e-01	4.9e-02		PCI/GDRY	12/23/2002
Co60	ND		5.0e-02	PCI/GDRY	12/23/2002
Cs137	ND		3.6e-02	PCI/GDRY	12/23/2002
I131	ND		3.1e+01	PCI/GDRY	12/23/2002
K40	9.00e+00	6.9e-01		PCI/GDRY	12/23/2002
Pb210	ND		8.4e+00	PCI/GDRY	12/23/2002
Pb212	2.55e-01	3.8e-02		PCI/GDRY	12/23/2002
Pb214 *	3.63e-01	4.4e-02		PCI/GDRY	12/23/2002
Ra226 *	3.52e-01	3.7e-01		PCI/GDRY	12/23/2002
Ra228	3.69e-01	7.1e-02		PCI/GDRY	12/23/2002
Tl208	1.40e-01	4.1e-02		PCI/GDRY	12/23/2002

* An asterisk indicates a result whose value may be significantly over or underestimated.

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02878L	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008730P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.570e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/22/2004 14:34	1000.0	GE02	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.0e+02	PCI/GDRY	12/23/2002
Bi212	4.07e-01	3.8e-01		PCI/GDRY	12/23/2002
Bi214 *	9.53e-01	1.2e-01		PCI/GDRY	12/23/2002
Co60	ND		1.0e-01	PCI/GDRY	12/23/2002
Cs137	3.81e-02	3.4e-02		PCI/GDRY	12/23/2002
I131	ND		4.7e+01	PCI/GDRY	12/23/2002
K40	6.74e+00	9.1e-01		PCI/GDRY	12/23/2002
Pb210	2.19e+00	2.1e+00		PCI/GDRY	12/23/2002
Pb212	4.77e-01	7.0e-02		PCI/GDRY	12/23/2002
Pb214 *	9.48e-01	1.0e-01		PCI/GDRY	12/23/2002
Ra226 *	2.16e+00	6.5e-01		PCI/GDRY	12/23/2002
Ra228	7.05e-01	1.4e-01		PCI/GDRY	12/23/2002
Tl208	2.77e-01	6.3e-02		PCI/GDRY	12/23/2002
U235 *	1.36e-01	4.1e-02		PCI/GDRY	12/23/2002

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GAMMA ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02879M	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008730P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.860e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/22/2004 14:34	1000.0	GE04	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.3e+02	PCI/GDRY	12/23/2002
Bi212	2.16e+00	5.0e-01		PCI/GDRY	12/23/2002
Bi214 *	2.90e+00	2.0e-01		PCI/GDRY	12/23/2002
Co60	ND		1.2e-01	PCI/GDRY	12/23/2002
Cs137	ND		8.0e-02	PCI/GDRY	12/23/2002
I131	ND		5.1e+01	PCI/GDRY	12/23/2002
K40	9.96e+00	9.6e-01		PCI/GDRY	12/23/2002
Pb210	ND		1.6e+01	PCI/GDRY	12/23/2002
Pb212	1.70e+00	1.3e-01		PCI/GDRY	12/23/2002
Pb214 *	3.17e+00	2.1e-01		PCI/GDRY	12/23/2002
Ra223 *	6.48e-01	1.6e-01		PCI/GDRY	12/23/2002
Ra224	3.71e+00	1.3e+00		PCI/GDRY	12/23/2002
Ra226 *	5.80e+00	8.3e-01		PCI/GDRY	12/23/2002
Ra228	1.85e+00	2.0e-01		PCI/GDRY	12/23/2002
Th227	2.12e-01	1.6e-01		PCI/GDRY	12/23/2002
Th234 *	2.88e+00	7.0e-01		PCI/GDRY	12/23/2002
Tl208	8.54e-01	1.0e-01		PCI/GDRY	12/23/2002
U235 *	3.51e-01	5.0e-02		PCI/GDRY	12/23/2002

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GAMMA ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02880E	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008730P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.430e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/22/2004 15:25	1000.0	GE06	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.2e+02	PCI/GDRY	01/27/2003
Bi212	1.06e+00	2.6e-01		PCI/GDRY	01/27/2003
Bi214 *	7.22e-01	6.7e-02		PCI/GDRY	01/27/2003
Co60	ND		5.5e-02	PCI/GDRY	01/27/2003
Cs137	1.86e-02	1.8e-02		PCI/GDRY	01/27/2003
I131	ND		3.2e+01	PCI/GDRY	01/27/2003
K40	1.23e+01	8.7e-01		PCI/GDRY	01/27/2003
Pb210	ND		3.3e+00	PCI/GDRY	01/27/2003
Pb212	8.82e-01	6.8e-02		PCI/GDRY	01/27/2003
Pb214 *	8.55e-01	6.9e-02		PCI/GDRY	01/27/2003
Ra223 *	3.34e-01	1.0e-01		PCI/GDRY	01/27/2003
Ra224	9.02e-01	7.3e-01		PCI/GDRY	01/27/2003
Ra226 *	1.31e+00	3.9e-01		PCI/GDRY	01/27/2003
Ra228	1.11e+00	1.1e-01		PCI/GDRY	01/27/2003
Th234 *	1.77e+00	3.6e-01		PCI/GDRY	01/27/2003
Tl208	4.33e-01	5.3e-02		PCI/GDRY	01/27/2003

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GAMMA ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02880E	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008730P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.430e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/23/2004 13:37	1000.0	GE17	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.1e+02	PCI/GDRY	01/27/2003
Bi212	1.21e+00	3.6e-01		PCI/GDRY	01/27/2003
Bi214 *	8.05e-01	7.1e-02		PCI/GDRY	01/27/2003
Co60	ND		6.1e-02	PCI/GDRY	01/27/2003
Cs137	4.05e-02	1.8e-02		PCI/GDRY	01/27/2003
I131	ND		2.6e+01	PCI/GDRY	01/27/2003
K40	1.19e+01	8.3e-01		PCI/GDRY	01/27/2003
Pb210	8.84e-01	2.5e-01		PCI/GDRY	01/27/2003
Pb212	9.46e-01	7.3e-02		PCI/GDRY	01/27/2003
Pb214 *	9.25e-01	6.8e-02		PCI/GDRY	01/27/2003
Ra223	2.51e-01	1.0e-01		PCI/GDRY	01/27/2003
Ra224 *	9.36e-01	6.0e-01		PCI/GDRY	01/27/2003
Ra226 *	1.81e+00	3.7e-01		PCI/GDRY	01/27/2003
Ra228	1.10e+00	1.3e-01		PCI/GDRY	01/27/2003
Th234 *	8.02e-01	1.4e-01		PCI/GDRY	01/27/2003
Tl208	4.74e-01	5.8e-02		PCI/GDRY	01/27/2003
U235 *	1.14e-01	2.3e-02		PCI/GDRY	01/27/2003

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**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02881F	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008730P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.700e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/22/2004 15:26	1000.0	GE07	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.9e+02	PCI/GDRY	01/27/2003
Bi212	1.76e+00	5.1e-01		PCI/GDRY	01/27/2003
Bi214 *	1.61e+00	1.3e-01		PCI/GDRY	01/27/2003
Co60	ND		7.7e-02	PCI/GDRY	01/27/2003
Cs137	ND		6.8e-02	PCI/GDRY	01/27/2003
I131	ND		5.0e+01	PCI/GDRY	01/27/2003
K40	1.17e+01	9.4e-01		PCI/GDRY	01/27/2003
Pb210	ND		2.0e+01	PCI/GDRY	01/27/2003
Pb212	1.82e+00	1.3e-01		PCI/GDRY	01/27/2003
Pb214 *	1.75e+00	1.3e-01		PCI/GDRY	01/27/2003
Ra223 *	5.46e-01	1.5e-01		PCI/GDRY	01/27/2003
Ra224	1.79e+00	1.2e+00		PCI/GDRY	01/27/2003
Ra226 *	3.40e+00	6.9e-01		PCI/GDRY	01/27/2003
Ra228	2.33e+00	2.0e-01		PCI/GDRY	01/27/2003
Th234 *	1.20e+00	6.0e-01		PCI/GDRY	01/27/2003
Tl208	9.14e-01	9.1e-02		PCI/GDRY	01/27/2003
U235 *	2.08e-01	4.2e-02		PCI/GDRY	01/27/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

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GAMMA ANALYSES
SDG #0400031

SAMPLE ANALYSIS REPORT

Sample #:	A4.02882G	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008730P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.040e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/22/2004 15:26	1000.0	GE08	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.8e+02	PCI/GDRY	01/27/2003
Bi212	1.10e+00	5.5e-01		PCI/GDRY	01/27/2003
Bi214 *	1.25e+00	1.1e-01		PCI/GDRY	01/27/2003
Co60	ND		8.3e-02	PCI/GDRY	01/27/2003
Cs137	ND		6.3e-02	PCI/GDRY	01/27/2003
I131	ND		4.7e+01	PCI/GDRY	01/27/2003
K40	1.10e+01	9.1e-01		PCI/GDRY	01/27/2003
Pb210	5.19e-01	7.3e-01		PCI/GDRY	01/27/2003
Pb212	1.00e+00	8.9e-02		PCI/GDRY	01/27/2003
Pb214 *	1.43e+00	1.1e-01		PCI/GDRY	01/27/2003
Ra223 *	4.25e-01	1.4e-01		PCI/GDRY	01/27/2003
Ra224	1.62e+00	9.4e-01		PCI/GDRY	01/27/2003
Ra226 *	2.86e+00	7.5e-01		PCI/GDRY	01/27/2003
Ra228	1.05e+00	1.5e-01		PCI/GDRY	01/27/2003
Th234 *	1.02e+00	2.6e-01		PCI/GDRY	01/27/2003
Tl208	4.52e-01	7.3e-02		PCI/GDRY	01/27/2003
U235 *	1.79e-01	4.7e-02		PCI/GDRY	01/27/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02883H	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008730P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.340e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/22/2004 14:40	1000.0	GE17	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND			PCI/GDRY	01/27/2003
Bi212	1.22e+00	5.0e-01		PCI/GDRY	01/27/2003
Bi214 *	1.62e+00	1.2e-01		PCI/GDRY	01/27/2003
Co60	ND		9.4e-02	PCI/GDRY	01/27/2003
Cs137	ND		6.2e-02	PCI/GDRY	01/27/2003
I131	ND		3.7e+01	PCI/GDRY	01/27/2003
K40	1.03e+01	8.4e-01		PCI/GDRY	01/27/2003
Pb210	2.15e+00	3.7e-01		PCI/GDRY	01/27/2003
Pb212	1.27e+00	9.6e-02		PCI/GDRY	01/27/2003
Pb214 *	1.82e+00	1.2e-01		PCI/GDRY	01/27/2003
Ra223 *	4.10e-01	9.5e-02		PCI/GDRY	01/27/2003
Ra224	2.23e+00	8.5e-01		PCI/GDRY	01/27/2003
Ra226 *	3.40e+00	5.7e-01		PCI/GDRY	01/27/2003
Ra228	1.53e+00	1.8e-01		PCI/GDRY	01/27/2003
Th234 *	1.05e+00	2.1e-01		PCI/GDRY	01/27/2003
Tl208	6.55e-01	8.0e-02		PCI/GDRY	01/27/2003
U235 *	1.91e-01	3.2e-02		PCI/GDRY	01/27/2003

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GAMMA ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02884J	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008730P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.900e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/22/2004 14:40	1000.0	GE18	RCL

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		1.4e+02	PCI/GDRY	02/05/2003
Bi212	5.82e-01	4.0e-01		PCI/GDRY	02/05/2003
Bi214 *	6.92e-01	7.6e-02		PCI/GDRY	02/05/2003
Co60	ND		6.4e-02	PCI/GDRY	02/05/2003
Cs137	5.41e-02	2.2e-02		PCI/GDRY	02/05/2003
I131	ND		3.3e+01	PCI/GDRY	02/05/2003
K40	1.10e+01	8.0e-01		PCI/GDRY	02/05/2003
Pb210	6.99e-01	3.7e-01		PCI/GDRY	02/05/2003
Pb212	5.25e-01	5.7e-02		PCI/GDRY	02/05/2003
Pb214 *	7.60e-01	6.9e-02		PCI/GDRY	02/05/2003
Ra223 *	1.99e-01	8.6e-02		PCI/GDRY	02/05/2003
Ra226 *	1.51e+00	4.1e-01		PCI/GDRY	02/05/2003
Ra228	5.95e-01	1.3e-01		PCI/GDRY	02/05/2003
Th234 *	2.81e-01	1.6e-01		PCI/GDRY	02/05/2003
Tl208	2.51e-01	6.1e-02		PCI/GDRY	02/05/2003
U235 *	9.50e-02	2.6e-02		PCI/GDRY	02/05/2003

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GAMMA ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02885K	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008734U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.610e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/23/2004 13:34	500.0	GE13	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND			PCI/GDRY	02/05/2003
Bi212	1.30e+00	4.7e-01		PCI/GDRY	02/05/2003
Bi214 *	1.42e+00	1.3e-01		PCI/GDRY	02/05/2003
Co60	ND		7.8e-02	PCI/GDRY	02/05/2003
Cs137	ND		6.4e-02	PCI/GDRY	02/05/2003
I131	ND		5.5e+01	PCI/GDRY	02/05/2003
K40	9.92e+00	9.1e-01		PCI/GDRY	02/05/2003
Pb210	ND		6.1e+00	PCI/GDRY	02/05/2003
Pb212	1.22e+00	1.1e-01		PCI/GDRY	02/05/2003
Pb214 *	1.55e+00	1.3e-01		PCI/GDRY	02/05/2003
Ra223 *	2.67e-01	2.3e-01		PCI/GDRY	02/05/2003
Ra224	9.59e-01	1.3e+00		PCI/GDRY	02/05/2003
Ra226 *	2.57e+00	7.9e-01		PCI/GDRY	02/05/2003
Ra228	1.47e+00	1.8e-01		PCI/GDRY	02/05/2003
Tl208	5.83e-01	8.6e-02		PCI/GDRY	02/05/2003
U235 *	1.61e-01	4.9e-02		PCI/GDRY	02/05/2003

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SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02886L	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008734U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.620e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/23/2004 21:57	500.0	GE13	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.4e+02	PCI/GDRY	02/05/2003
Bi212	6.43e-01	3.3e-01		PCI/GDRY	02/05/2003
Bi214 *	6.64e-01	6.9e-02		PCI/GDRY	02/05/2003
Co60	ND		4.3e-02	PCI/GDRY	02/05/2003
Cs137	5.32e-02	2.1e-02		PCI/GDRY	02/05/2003
I131	ND		3.5e+01	PCI/GDRY	02/05/2003
K40	1.19e+01	8.8e-01		PCI/GDRY	02/05/2003
Pb210	ND		4.0e+00	PCI/GDRY	02/05/2003
Pb212	4.78e-01	5.7e-02		PCI/GDRY	02/05/2003
Pb214 *	7.50e-01	7.0e-02		PCI/GDRY	02/05/2003
Ra226 *	1.60e+00	5.1e-01		PCI/GDRY	02/05/2003
Ra228	6.02e-01	9.9e-02		PCI/GDRY	02/05/2003
Tl208	1.88e-01	4.9e-02		PCI/GDRY	02/05/2003
U235 *	1.04e-01	3.1e-02		PCI/GDRY	02/05/2003

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SDG #0400031

SAMPLE ANALYSIS REPORT

Sample #:	A4.02887M	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008734U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.740e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/23/2004 13:34	300.0	GE14	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.5e+02	PCI/GDRY	02/11/2003
Bi212	6.41e-01	3.2e-01		PCI/GDRY	02/11/2003
Bi214 *	7.38e-01	7.2e-02		PCI/GDRY	02/11/2003
Co60	ND		6.1e-02	PCI/GDRY	02/11/2003
Cs137	7.21e-02	2.3e-02		PCI/GDRY	02/11/2003
I131	ND		4.2e+01	PCI/GDRY	02/11/2003
K40	1.37e+01	9.6e-01		PCI/GDRY	02/11/2003
Pb210	ND		2.5e+00	PCI/GDRY	02/11/2003
Pb212	5.18e-01	6.1e-02		PCI/GDRY	02/11/2003
Pb214 *	8.29e-01	7.0e-02		PCI/GDRY	02/11/2003
Ra223 *	2.16e-01	1.1e-01		PCI/GDRY	02/11/2003
Ra226 *	1.92e+00	5.4e-01		PCI/GDRY	02/11/2003
Ra228	6.67e-01	9.7e-02		PCI/GDRY	02/11/2003
Th234 *	5.07e-01	3.1e-01		PCI/GDRY	02/11/2003
Tl208	2.25e-01	4.6e-02		PCI/GDRY	02/11/2003

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SAMPLE ANALYSIS REPORT

Sample #:	A4.0288N	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008734U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.020e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/23/2004 18:36	300.0	GE14	RCL

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		1.3e+02	PCI/GDRY	03/06/2003
Bi212	2.69e-01	2.8e-01		PCI/GDRY	03/06/2003
Bi214 *	6.70e-01	6.2e-02		PCI/GDRY	03/06/2003
Co60	ND		5.1e-02	PCI/GDRY	03/06/2003
Cs137	ND		4.6e-02	PCI/GDRY	03/06/2003
I131	ND		3.6e+01	PCI/GDRY	03/06/2003
K40	1.45e+01	9.8e-01		PCI/GDRY	03/06/2003
Pb210	ND		2.0e+00	PCI/GDRY	03/06/2003
Pb212	3.90e-01	4.8e-02		PCI/GDRY	03/06/2003
Pb214 *	8.33e-01	6.7e-02		PCI/GDRY	03/06/2003
Ra226 *	1.54e+00	4.6e-01		PCI/GDRY	03/06/2003
Ra228	4.73e-01	8.1e-02		PCI/GDRY	03/06/2003
Th234 *	7.62e-01	2.6e-01		PCI/GDRY	03/06/2003
Tl208	1.90e-01	3.6e-02		PCI/GDRY	03/06/2003

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SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02889P	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008734U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.600e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/23/2004 23:38	300.0	GE14	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND			PCI/GDRY	03/27/2003
Bi212	1.46e+00	4.9e-01		PCI/GDRY	03/27/2003
Bi214 *	1.02e+00	1.0e-01		PCI/GDRY	03/27/2003
Co60	ND		8.1e-02	PCI/GDRY	03/27/2003
Cs137	ND		7.4e-02	PCI/GDRY	03/27/2003
I131	ND		6.0e+01	PCI/GDRY	03/27/2003
K40	9.87e+00	8.3e-01		PCI/GDRY	03/27/2003
Pb210	ND		4.2e+00	PCI/GDRY	03/27/2003
Pb212	1.34e+00	1.1e-01		PCI/GDRY	03/27/2003
Pb214 *	1.14e+00	1.0e-01		PCI/GDRY	03/27/2003
Ra224	2.29e+00	1.0e+00		PCI/GDRY	03/27/2003
Ra226 *	2.38e+00	7.6e-01		PCI/GDRY	03/27/2003
Ra228	1.61e+00	1.6e-01		PCI/GDRY	03/27/2003
Tl208	6.17e-01	7.5e-02		PCI/GDRY	03/27/2003
U235 *	1.46e-01	4.5e-02		PCI/GDRY	03/27/2003

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02890G	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008734U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.130e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/23/2004 13:37	1000.0	GE05	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.8e+02	PCI/GDRY	03/27/2003
Bi212	6.78e-01	3.9e-01		PCI/GDRY	03/27/2003
Bi214 *	1.13e+00	1.1e-01		PCI/GDRY	03/27/2003
Co60	ND		8.2e-02	PCI/GDRY	03/27/2003
Cs137	ND		6.6e-02	PCI/GDRY	03/27/2003
I131	ND		4.7e+01	PCI/GDRY	03/27/2003
K40	1.11e+01	9.4e-01		PCI/GDRY	03/27/2003
Pb210	ND		3.3e+00	PCI/GDRY	03/27/2003
Pb212	8.26e-01	8.1e-02		PCI/GDRY	03/27/2003
Pb214 *	1.22e+00	1.0e-01		PCI/GDRY	03/27/2003
Ra223 *	3.57e-01	1.4e-01		PCI/GDRY	03/27/2003
Ra224	6.57e-01	1.1e+00		PCI/GDRY	03/27/2003
Ra226 *	2.53e+00	6.6e-01		PCI/GDRY	03/27/2003
Ra228	8.38e-01	1.5e-01		PCI/GDRY	03/27/2003
Th234 *	1.04e+00	4.5e-01		PCI/GDRY	03/27/2003
Tl208	4.06e-01	7.1e-02		PCI/GDRY	03/27/2003
U235 *	1.59e-01	4.1e-02		PCI/GDRY	03/27/2003

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GAMMA ANALYSES
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SAMPLE ANALYSIS REPORT

Sample #:	A4.02891H	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008734U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.840e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/23/2004 13:37	1000.0	GE06	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.5e+02	PCI/GDRY	03/27/2003
Bi212	1.24e+00	3.6e-01		PCI/GDRY	03/27/2003
Bi214 *	1.61e+00	1.2e-01		PCI/GDRY	03/27/2003
Co60	ND		5.8e-02	PCI/GDRY	03/27/2003
Cs137	ND		5.8e-02	PCI/GDRY	03/27/2003
I131	ND		4.2e+01	PCI/GDRY	03/27/2003
K40	1.07e+01	8.5e-01		PCI/GDRY	03/27/2003
Pb210	ND		4.2e+00	PCI/GDRY	03/27/2003
Pb212	1.33e+00	9.8e-02		PCI/GDRY	03/27/2003
Pb214 *	1.72e+00	1.2e-01		PCI/GDRY	03/27/2003
Ra223 *	3.79e-01	1.0e-01		PCI/GDRY	03/27/2003
Ra224	1.37e+00	9.0e-01		PCI/GDRY	03/27/2003
Ra226 *	3.43e+00	5.9e-01		PCI/GDRY	03/27/2003
Ra228	1.65e+00	1.5e-01		PCI/GDRY	03/27/2003
Th234 *	2.30e+00	4.8e-01		PCI/GDRY	03/27/2003
Tl208	5.98e-01	6.5e-02		PCI/GDRY	03/27/2003
U235 *	2.08e-01	3.6e-02		PCI/GDRY	03/27/2003

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02892J	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008734U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.240e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/23/2004 13:37	1000.0	GE07	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.0e+02	PCI/GDRY	03/27/2003
Bi212	3.10e-01	2.3e-01		PCI/GDRY	03/27/2003
Bi214 *	3.68e-01	4.9e-02		PCI/GDRY	03/27/2003
Co60	ND		4.1e-02	PCI/GDRY	03/27/2003
Cs137	ND		3.6e-02	PCI/GDRY	03/27/2003
I131	ND		2.4e+01	PCI/GDRY	03/27/2003
K40	1.37e+01	9.1e-01		PCI/GDRY	03/27/2003
Pb210	ND		9.5e+00	PCI/GDRY	03/27/2003
Pb212	2.94e-01	4.0e-02		PCI/GDRY	03/27/2003
Pb214 *	4.22e-01	4.6e-02		PCI/GDRY	03/27/2003
Ra223 *	1.35e-01	6.8e-02		PCI/GDRY	03/27/2003
Ra224	5.81e-01	6.1e-01		PCI/GDRY	03/27/2003
Ra226 *	7.16e-01	3.5e-01		PCI/GDRY	03/27/2003
Ra228	3.52e-01	7.4e-02		PCI/GDRY	03/27/2003
Th234 *	6.78e-01	2.9e-01		PCI/GDRY	03/27/2003
Tl208	1.50e-01	3.5e-02		PCI/GDRY	03/27/2003

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02893K	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008738Y
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.610e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/24/2004 16:18	300.0	GE14	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.0e+02	PCI/GDRY	04/04/2003
Bi212	1.52e+00	4.6e-01		PCI/GDRY	04/04/2003
Bi214 *	7.81e-01	8.7e-02		PCI/GDRY	04/04/2003
Co60	ND		6.7e-02	PCI/GDRY	04/04/2003
Cs137	6.09e-02	3.4e-02		PCI/GDRY	04/04/2003
I131	ND		6.3e+01	PCI/GDRY	04/04/2003
K40	1.04e+01	8.6e-01		PCI/GDRY	04/04/2003
Pb210	ND		4.1e+00	PCI/GDRY	04/04/2003
Pb212	1.49e+00	1.2e-01		PCI/GDRY	04/04/2003
Pb214 *	9.67e-01	9.1e-02		PCI/GDRY	04/04/2003
Ra223 *	3.18e-01	2.0e-01		PCI/GDRY	04/04/2003
Ra224	2.19e+00	1.1e+00		PCI/GDRY	04/04/2003
Ra226 *	2.04e+00	7.0e-01		PCI/GDRY	04/04/2003
Ra228	1.96e+00	1.8e-01		PCI/GDRY	04/04/2003
Tl208	6.83e-01	7.9e-02		PCI/GDRY	04/04/2003
U235 *	1.28e-01	4.4e-02		PCI/GDRY	04/04/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02894L	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008738Y
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.590e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/24/2004 21:20	300.0	GE14	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.1e+02	PCI/GDRY	04/04/2003
Bi212	1.03e+00	4.0e-01		PCI/GDRY	04/04/2003
Bi214 *	8.92e-01	9.0e-02		PCI/GDRY	04/04/2003
Co60	ND		6.3e-02	PCI/GDRY	04/04/2003
Cs137	1.93e-01	3.4e-02		PCI/GDRY	04/04/2003
I131	ND		5.9e+01	PCI/GDRY	04/04/2003
K40	1.29e+01	9.8e-01		PCI/GDRY	04/04/2003
Pb210	ND		3.4e+00	PCI/GDRY	04/04/2003
Pb212	1.18e+00	1.0e-01		PCI/GDRY	04/04/2003
Pb214 *	1.05e+00	9.3e-02		PCI/GDRY	04/04/2003
Ra223 *	3.41e-01	1.5e-01		PCI/GDRY	04/04/2003
Ra224	1.05e+00	1.0e+00		PCI/GDRY	04/04/2003
Ra226 *	1.52e+00	6.3e-01		PCI/GDRY	04/04/2003
Ra228	1.50e+00	1.5e-01		PCI/GDRY	04/04/2003
Tl208	5.31e-01	6.6e-02		PCI/GDRY	04/04/2003
U235 *	9.50e-02	4.0e-02		PCI/GDRY	04/04/2003

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**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02895M	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008738Y
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.610e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/25/2004 02:22	300.0	GE14	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.0e+02	PCI/GDRY	04/04/2003
Bi212	1.78e+00	4.3e-01		PCI/GDRY	04/04/2003
Bi214 *	9.33e-01	9.2e-02		PCI/GDRY	04/04/2003
Co60	ND		7.0e-02	PCI/GDRY	04/04/2003
Cs137	ND		6.5e-02	PCI/GDRY	04/04/2003
I131	ND		5.6e+01	PCI/GDRY	04/04/2003
K40	1.36e+01	1.0e+00		PCI/GDRY	04/04/2003
Pb210	ND		3.5e+00	PCI/GDRY	04/04/2003
Pb212	1.67e+00	1.3e-01		PCI/GDRY	04/04/2003
Pb214 *	1.09e+00	9.2e-02		PCI/GDRY	04/04/2003
Ra223 *	2.63e-01	1.6e-01		PCI/GDRY	04/04/2003
Ra224	2.23e+00	1.1e+00		PCI/GDRY	04/04/2003
Ra226 *	2.15e+00	6.9e-01		PCI/GDRY	04/04/2003
Ra228	1.94e+00	1.7e-01		PCI/GDRY	04/04/2003
Tl208	7.20e-01	7.7e-02		PCI/GDRY	04/04/2003
U235 *	1.35e-01	4.3e-02		PCI/GDRY	04/04/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02896N	QC batch #:	0003230R
Matrix:	SOIL	Prep batch #:	0008738Y
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.040e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/24/2004 16:18	500.0	GE13	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.3e+02	PCI/GDRY	04/04/2003
Bi212	1.46e+00	3.2e-01		PCI/GDRY	04/04/2003
Bi214 *	7.79e-01	7.3e-02		PCI/GDRY	04/04/2003
Co60	ND		4.8e-02	PCI/GDRY	04/04/2003
Cs137	ND		4.2e-02	PCI/GDRY	04/04/2003
I131	ND		3.8e+01	PCI/GDRY	04/04/2003
K40	1.08e+01	8.1e-01		PCI/GDRY	04/04/2003
Pb210	ND		4.2e+00	PCI/GDRY	04/04/2003
Pb212	1.21e+00	9.2e-02		PCI/GDRY	04/04/2003
Pb214 *	8.76e-01	7.5e-02		PCI/GDRY	04/04/2003
Ra223 *	2.97e-01	1.3e-01		PCI/GDRY	04/04/2003
Ra224	1.51e+00	9.2e-01		PCI/GDRY	04/04/2003
Ra226 *	1.71e+00	4.8e-01		PCI/GDRY	04/04/2003
Ra228	1.39e+00	1.3e-01		PCI/GDRY	04/04/2003
Tl208	5.71e-01	5.8e-02		PCI/GDRY	04/04/2003
U235 *	1.07e-01	3.0e-02		PCI/GDRY	04/04/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400031**

QC BATCH SUMMARY

QC batch #: 0003230R
 Preparation procedure: N/A
 Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	$\pm 2\sigma$ Uncertainty (%)	Analyst
A4.02877K		N/A		RCL
A4.02878L		N/A		RCL
A4.02879M		N/A		RCL
A4.02880E		N/A		RCL
A4.02880E	DUP	N/A		RCL
A4.02881F		N/A		RCL
A4.02882G		N/A		RCL
A4.02883H		N/A		RCL
A4.02884J		N/A		RCL
A4.02885K		N/A		RCL
A4.02886L		N/A		RCL
A4.02887M		N/A		RCL
A4.02888N		N/A		RCL
A4.02889P		N/A		RCL
A4.02890G		N/A		RCL
A4.02891H		N/A		RCL
A4.02892J		N/A		RCL
A4.02893K		N/A		RCL
A4.02894L		N/A		RCL
A4.02895M		N/A		RCL
A4.02896N		N/A		RCL

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0003230R

Analytical Procedure: NAREL GAM-01

LABORATORY DUPLICATES (PCI/GDRY)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
A4.02880E	BA140				
A4.02880E	BI212	1.06e+00 \pm 2.6e-01	1.21e+00 \pm 3.6e-01	13.22	0.64 OK
A4.02880E	CO60				
A4.02880E	CS137	1.86e-02 \pm 1.8e-02	4.05e-02 \pm 1.8e-02	74.11	1.71 OK
A4.02880E	I131				
A4.02880E	K40	1.23e+01 \pm 8.7e-01	1.19e+01 \pm 8.3e-01	3.31	-0.38 OK
A4.02880E	PB210		8.84e-01 \pm 2.5e-01		
A4.02880E	PB212	8.82e-01 \pm 6.8e-02	9.46e-01 \pm 7.3e-02	7.00	0.78 OK
A4.02880E	RA228	1.11e+00 \pm 1.1e-01	1.10e+00 \pm 1.3e-01	0.90	-0.09 OK
A4.02880E	TL208	4.33e-01 \pm 5.3e-02	4.74e-01 \pm 5.8e-02	9.04	0.81 OK

Analyst:

Robert C. Lowry 6-30-04

Lowry, Robert C.

QA Officer:

Linda D. McLean 7/6/04

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0400032

Project: LINDSAY LIGHT II
 Analysis Procedure: Gamma Spectrometry
 Date Reported: 06/30/2004

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A4.02897P	11C#1	SAM	SOIL	04/04/2003	06/10/2004
A4.02898Q	11C#2	SAM	SOIL	04/04/2003	06/10/2004
A4.02899R	11D	SAM	SOIL	04/04/2003	06/10/2004
A4.02900Q	9D/9C NE	SAM	SOIL	04/11/2003	06/10/2004
A4.02901R	9D/9C SE	SAM	SOIL	04/11/2003	06/10/2004
A4.02902T	9D/9C NW	SAM	SOIL	04/11/2003	06/10/2004
A4.02903U	9D/9C SW	SAM	SOIL	04/11/2003	06/10/2004
A4.02904V	10D#2	SAM	SOIL	04/11/2003	06/10/2004
A4.02905W	C-218 (73)	SAM	SOIL	06/20/2003	06/10/2004
A4.02906X	C-201(31)#1	SAM	SOIL	07/08/2003	06/10/2004
A4.02907Y	C-201(31)#2	SAM	SOIL	07/08/2003	06/10/2004
A4.02908Z	12C#1	SAM	SOIL	08/27/2003	06/10/2004
A4.02909A	12C#2	SAM	SOIL	08/27/2003	06/10/2004
A4.02910T	12C#3	SAM	SOIL	08/27/2003	06/10/2004
A4.02911U	C-2-3 CAISSON	SAM	SOIL	11/11/2003	06/10/2004
A4.02912V	13D EAST	SAM	SOIL	11/11/2003	06/10/2004
A4.02913W	13D WEST	SAM	SOIL	11/11/2003	06/10/2004

EXCEPTIONS

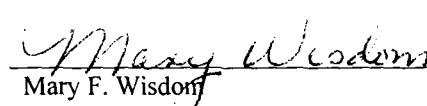
1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

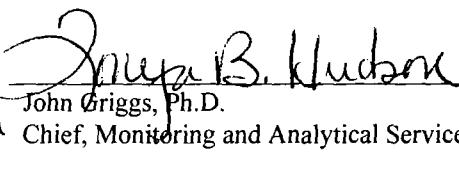
1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

 7/16/04

Mary F. Wisdom Date
Quality Assurance Coordinator

 7/16/04

John Briggs, Ph.D. Date
Chief, Monitoring and Analytical Services Branch
fcr

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400032**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
 Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A4.02897P	DUP	N/A	06/25/2004	0008738Y	0003293H
A4.02898Q		N/A	06/25/2004	0008738Y	0003293H
A4.02899R		N/A	06/25/2004	0008738Y	0003293H
A4.02900Q		N/A	06/25/2004	0008738Y	0003293H
A4.02900Q		N/A	06/26/2004	0008738Y	0003293H
A4.02901R		N/A	06/25/2004	0008738Y	0003293H
A4.02902T		N/A	06/25/2004	0008738Y	0003293H
A4.02903U		N/A	06/25/2004	0008738Y	0003293H
A4.02904V		N/A	06/29/2004	0008749B	0003293H
A4.02905W		N/A	06/30/2004	0008749B	0003293H
A4.02906X		N/A	06/29/2004	0008749B	0003293H
A4.02907Y		N/A	06/29/2004	0008749B	0003293H
A4.02908Z		N/A	06/30/2004	0008749B	0003293H
A4.02909A		N/A	06/30/2004	0008749B	0003293H
A4.02910T		N/A	06/30/2004	0008749B	0003293H
A4.02911U		N/A	06/30/2004	0008749B	0003293H
A4.02912V		N/A	06/30/2004	0008749B	0003293H
A4.02913W		N/A	06/30/2004	0008749B	0003293H

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02897P	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008738Y
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.240e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/25/2004 00:41	500.0	GE13	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.5e+02	PCI/GDRY	04/04/2003
Bi212	3.14e-01	3.5e-01		PCI/GDRY	04/04/2003
Bi214 *	4.75e-01	6.9e-02		PCI/GDRY	04/04/2003
Co60	ND		5.6e-02	PCI/GDRY	04/04/2003
Cs137	6.51e-02	2.3e-02		PCI/GDRY	04/04/2003
I131	ND		4.0e+01	PCI/GDRY	04/04/2003
K40	1.10e+01	8.7e-01		PCI/GDRY	04/04/2003
Pb210	ND		4.4e+00	PCI/GDRY	04/04/2003
Pb212	4.18e-01	6.4e-02		PCI/GDRY	04/04/2003
Pb214 *	5.15e-01	6.8e-02		PCI/GDRY	04/04/2003
Ra226 *	7.79e-01	5.5e-01		PCI/GDRY	04/04/2003
Ra228	5.34e-01	1.0e-01		PCI/GDRY	04/04/2003
Tl208	1.96e-01	4.9e-02		PCI/GDRY	04/04/2003
U235 *	4.89e-02	3.5e-02		PCI/GDRY	04/04/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02898Q	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008738Y
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.210e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/24/2004 16:21	1000.0	GE05	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.1e+02	PCI/GDRY	04/04/2003
Bi212	2.56e+00	5.4e-01		PCI/GDRY	04/04/2003
Bi214 *	1.17e+00	1.1e-01		PCI/GDRY	04/04/2003
Co60	ND		8.1e-02	PCI/GDRY	04/04/2003
Cs137	6.91e-02	3.1e-02		PCI/GDRY	04/04/2003
I131	ND		5.4e+01	PCI/GDRY	04/04/2003
K40	1.31e+01	1.0e+00		PCI/GDRY	04/04/2003
Pb210	ND		4.1e+00	PCI/GDRY	04/04/2003
Pb212	2.12e+00	1.4e-01		PCI/GDRY	04/04/2003
Pb214 *	1.29e+00	1.1e-01		PCI/GDRY	04/04/2003
Ra223 *	5.45e-01	1.3e-01		PCI/GDRY	04/04/2003
Ra224	3.22e+00	1.3e+00		PCI/GDRY	04/04/2003
Ra226 *	3.15e+00	7.6e-01		PCI/GDRY	04/04/2003
Ra228	2.47e+00	2.2e-01		PCI/GDRY	04/04/2003
Th234 *	1.99e+00	4.9e-01		PCI/GDRY	04/04/2003
Tl208	9.89e-01	9.3e-02		PCI/GDRY	04/04/2003
U235 *	1.97e-01	4.8e-02		PCI/GDRY	04/04/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02899R	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008738Y
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.660e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/24/2004 16:21	1000.0	GE06	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.4e+02	PCI/GDRY	04/04/2003
Bi212	9.33e-01	3.3e-01		PCI/GDRY	04/04/2003
Bi214 *	8.78e-01	8.4e-02		PCI/GDRY	04/04/2003
Co60	ND		6.6e-02	PCI/GDRY	04/04/2003
Cs137	ND		5.2e-02	PCI/GDRY	04/04/2003
I131	ND		3.5e+01	PCI/GDRY	04/04/2003
K40	1.33e+01	9.7e-01		PCI/GDRY	04/04/2003
Pb210	3.87e+00	2.4e+00		PCI/GDRY	04/04/2003
Pb212	9.45e-01	7.7e-02		PCI/GDRY	04/04/2003
Pb214 *	9.53e-01	8.0e-02		PCI/GDRY	04/04/2003
Ra223 *	2.64e-01	1.1e-01		PCI/GDRY	04/04/2003
Ra224	1.04e+00	8.4e-01		PCI/GDRY	04/04/2003
Ra226 *	1.75e+00	5.1e-01		PCI/GDRY	04/04/2003
Ra228	1.11e+00	1.3e-01		PCI/GDRY	04/04/2003
Th234 *	1.75e+00	4.9e-01		PCI/GDRY	04/04/2003
Tl208	4.08e-01	5.6e-02		PCI/GDRY	04/04/2003
U235 *	1.13e-01	3.1e-02		PCI/GDRY	04/04/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02900Q	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008738Y
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.180e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/24/2004 16:21	1000.0	GE07	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND			PCI/GDRY	04/11/2003
Bi212	9.21e-01	3.5e-01		PCI/GDRY	04/11/2003
Bi214 *	1.00e+00	8.4e-02		PCI/GDRY	04/11/2003
Co60	ND		5.5e-02	PCI/GDRY	04/11/2003
Cs137	ND		4.5e-02	PCI/GDRY	04/11/2003
I131	ND		3.4e+01	PCI/GDRY	04/11/2003
K40	1.20e+01	8.7e-01		PCI/GDRY	04/11/2003
Pb210	ND		1.3e+01	PCI/GDRY	04/11/2003
Pb212	8.51e-01	7.2e-02		PCI/GDRY	04/11/2003
Pb214 *	1.09e+00	8.2e-02		PCI/GDRY	04/11/2003
Ra223 *	2.72e-01	9.7e-02		PCI/GDRY	04/11/2003
Ra224	9.85e-01	8.1e-01		PCI/GDRY	04/11/2003
Ra226 *	2.04e+00	5.0e-01		PCI/GDRY	04/11/2003
Ra228	9.59e-01	1.1e-01		PCI/GDRY	04/11/2003
Th234 *	1.27e+00	4.3e-01		PCI/GDRY	04/11/2003
Tl208	3.75e-01	5.0e-02		PCI/GDRY	04/11/2003
U235 *	1.28e-01	3.1e-02		PCI/GDRY	04/11/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02900Q	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008738Y
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.180e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/25/2004 15:45	1000.0	GE10	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.2e+02	PCI/GDRY	04/11/2003
Bi212	1.12e+00	2.5e-01		PCI/GDRY	04/11/2003
Bi214 *	9.95e-01	8.3e-02		PCI/GDRY	04/11/2003
Co60	ND		6.3e-02	PCI/GDRY	04/11/2003
Cs137	ND		4.6e-02	PCI/GDRY	04/11/2003
I131	ND		3.0e+01	PCI/GDRY	04/11/2003
K40	1.16e+01	8.3e-01		PCI/GDRY	04/11/2003
Pb210	ND		2.7e+00	PCI/GDRY	04/11/2003
Pb212	9.18e-01	6.9e-02		PCI/GDRY	04/11/2003
Pb214 *	1.15e+00	8.2e-02		PCI/GDRY	04/11/2003
Ra223 *	3.04e-01	8.0e-02		PCI/GDRY	04/11/2003
Ra224	1.61e+00	6.1e-01		PCI/GDRY	04/11/2003
Ra226 *	2.06e+00	3.9e-01		PCI/GDRY	04/11/2003
Ra228	9.21e-01	1.0e-01		PCI/GDRY	04/11/2003
Th227	6.44e-02	6.9e-02		PCI/GDRY	04/11/2003
Tl208	4.21e-01	4.7e-02		PCI/GDRY	04/11/2003
U235 *	1.27e-01	2.4e-02		PCI/GDRY	04/11/2003

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GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02901R	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008738Y
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.700e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/24/2004 16:23	1000.0	GE09	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND			PCI/GDRY	04/11/2003
Bi212	2.12e+00	3.8e-01		PCI/GDRY	04/11/2003
Bi214 *	1.35e+00	1.1e-01		PCI/GDRY	04/11/2003
Co60	ND		6.6e-02	PCI/GDRY	04/11/2003
Cs137	ND		5.2e-02	PCI/GDRY	04/11/2003
I131	ND		3.9e+01	PCI/GDRY	04/11/2003
K40	1.15e+01	8.7e-01		PCI/GDRY	04/11/2003
Pb210	ND		7.2e+00	PCI/GDRY	04/11/2003
Pb212	1.93e+00	1.3e-01		PCI/GDRY	04/11/2003
Pb214 *	1.49e+00	1.1e-01		PCI/GDRY	04/11/2003
Ra223 *	4.51e-01	1.1e-01		PCI/GDRY	04/11/2003
Ra224	1.90e+00	9.4e-01		PCI/GDRY	04/11/2003
Ra226 *	2.58e+00	5.6e-01		PCI/GDRY	04/11/2003
Ra228	2.25e+00	1.7e-01		PCI/GDRY	04/11/2003
Th234 *	1.30e+00	4.2e-01		PCI/GDRY	04/11/2003
Tl208	8.86e-01	7.7e-02		PCI/GDRY	04/11/2003
U235 *	1.62e-01	3.5e-02		PCI/GDRY	04/11/2003

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GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02902T	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008738Y
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.890e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/24/2004 16:23	1000.0	GE10	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.3e+02	PCI/GDRY	04/11/2003
Bi212	8.75e-01	2.8e-01		PCI/GDRY	04/11/2003
Bi214 *	8.26e-01	7.7e-02		PCI/GDRY	04/11/2003
Co60	ND		6.3e-02	PCI/GDRY	04/11/2003
Cs137	ND		4.4e-02	PCI/GDRY	04/11/2003
I131	ND		3.1e+01	PCI/GDRY	04/11/2003
K40	1.11e+01	8.2e-01		PCI/GDRY	04/11/2003
Pb210	ND		3.0e+00	PCI/GDRY	04/11/2003
Pb212	9.62e-01	7.5e-02		PCI/GDRY	04/11/2003
Pb214 *	9.25e-01	7.4e-02		PCI/GDRY	04/11/2003
Ra223 *	2.52e-01	8.0e-02		PCI/GDRY	04/11/2003
Ra224	1.32e+00	6.4e-01		PCI/GDRY	04/11/2003
Ra226	ND		5.4e-01	PCI/GDRY	04/11/2003
Ra228	1.07e+00	1.2e-01		PCI/GDRY	04/11/2003
Th234 *	9.10e-01	3.5e-01		PCI/GDRY	04/11/2003
Tl208	4.46e-01	5.3e-02		PCI/GDRY	04/11/2003
U235 *	1.35e-01	2.9e-02		PCI/GDRY	04/11/2003

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SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02903U	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008738Y
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.080e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/24/2004 16:23	1000.0	GE12	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.0e+02	PCI/GDRY	04/11/2003
Bi212	1.57e+00	3.4e-01		PCI/GDRY	04/11/2003
Bi214 *	1.39e+00	1.1e-01		PCI/GDRY	04/11/2003
Co60	ND		7.6e-02	PCI/GDRY	04/11/2003
Cs137	ND		6.4e-02	PCI/GDRY	04/11/2003
I131	ND		5.0e+01	PCI/GDRY	04/11/2003
K40	1.38e+01	1.0e+00		PCI/GDRY	04/11/2003
Pb210	ND		7.3e+00	PCI/GDRY	04/11/2003
Pb212	1.64e+00	1.2e-01		PCI/GDRY	04/11/2003
Pb214 *	1.48e+00	1.1e-01		PCI/GDRY	04/11/2003
Ra223 *	5.38e-01	1.4e-01		PCI/GDRY	04/11/2003
Ra224	1.66e+00	8.4e-01		PCI/GDRY	04/11/2003
Ra226 *	2.67e+00	6.5e-01		PCI/GDRY	04/11/2003
Ra228	1.96e+00	1.9e-01		PCI/GDRY	04/11/2003
Th234 *	8.36e-01	5.4e-01		PCI/GDRY	04/11/2003
Tl208	7.31e-01	7.7e-02		PCI/GDRY	04/11/2003

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GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02904V	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008749B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.180e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/29/2004 13:48	500.0	GE13	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.6e+02	PCI/GDRY	04/11/2003
Bi212	1.00e+00	3.7e-01		PCI/GDRY	04/11/2003
Bi214 *	5.74e-01	7.1e-02		PCI/GDRY	04/11/2003
Co60	ND		6.2e-02	PCI/GDRY	04/11/2003
Cs137	ND		5.4e-02	PCI/GDRY	04/11/2003
I131	ND		4.1e+01	PCI/GDRY	04/11/2003
K40	1.15e+01	9.0e-01		PCI/GDRY	04/11/2003
Pb210	ND		4.7e+00	PCI/GDRY	04/11/2003
Pb212	7.44e-01	7.7e-02		PCI/GDRY	04/11/2003
Pb214 *	6.57e-01	7.4e-02		PCI/GDRY	04/11/2003
Ra226 *	1.19e+00	5.9e-01		PCI/GDRY	04/11/2003
Ra228	8.06e-01	1.2e-01		PCI/GDRY	04/11/2003
Tl208	3.15e-01	5.5e-02		PCI/GDRY	04/11/2003
U235 *	7.45e-02	3.7e-02		PCI/GDRY	04/11/2003

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GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02905W	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008749B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.400e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/29/2004 22:11	500.0	GE13	RCL

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		1.3e+02	PCI/GDRY	06/20/2003
Bi212	7.06e-01	3.4e-01		PCI/GDRY	06/20/2003
Bi214 *	5.95e-01	6.7e-02		PCI/GDRY	06/20/2003
Co60	ND		5.3e-02	PCI/GDRY	06/20/2003
Cs137	5.16e-02	2.1e-02		PCI/GDRY	06/20/2003
I131	ND		3.8e+01	PCI/GDRY	06/20/2003
K40	1.17e+01	8.8e-01		PCI/GDRY	06/20/2003
Pb210	ND		4.1e+00	PCI/GDRY	06/20/2003
Pb212	5.58e-01	6.4e-02		PCI/GDRY	06/20/2003
Pb214 *	6.90e-01	7.0e-02		PCI/GDRY	06/20/2003
Ra226 *	1.43e+00	5.1e-01		PCI/GDRY	06/20/2003
Ra228	6.10e-01	9.9e-02		PCI/GDRY	06/20/2003
Tl208	2.33e-01	4.4e-02		PCI/GDRY	06/20/2003
U235 *	8.95e-02	3.2e-02		PCI/GDRY	06/20/2003

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GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02906X	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008749B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.900e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/29/2004 13:49	300.0	GE14	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.7e+02	PCI/GDRY	07/08/2003
Bi212	2.00e+00	4.1e-01		PCI/GDRY	07/08/2003
Bi214 *	8.19e-01	8.1e-02		PCI/GDRY	07/08/2003
Co60	ND		5.4e-02	PCI/GDRY	07/08/2003
Cs137	ND		5.4e-02	PCI/GDRY	07/08/2003
I131	ND		4.8e+01	PCI/GDRY	07/08/2003
K40	1.20e+01	8.8e-01		PCI/GDRY	07/08/2003
Pb210	ND		3.4e+00	PCI/GDRY	07/08/2003
Pb212	1.74e+00	1.2e-01		PCI/GDRY	07/08/2003
Pb214 *	9.67e-01	8.4e-02		PCI/GDRY	07/08/2003
Ra223 *	5.42e-01	1.5e-01		PCI/GDRY	07/08/2003
Ra224	2.49e+00	1.0e+00		PCI/GDRY	07/08/2003
Ra226 *	2.17e+00	6.0e-01		PCI/GDRY	07/08/2003
Ra228	2.12e+00	1.7e-01		PCI/GDRY	07/08/2003
Th234 *	9.33e-01	4.4e-01		PCI/GDRY	07/08/2003
Tl208	6.92e-01	6.5e-02		PCI/GDRY	07/08/2003
U235 *	1.36e-01	3.7e-02		PCI/GDRY	07/08/2003

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GAMMA ANALYSES
SDG #0400032

SAMPLE ANALYSIS REPORT

Sample #:	A4.02907Y	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008749B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.250e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/29/2004 18:51	300.0	GE14	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.0e+02	PCI/GDRY	07/08/2003
Bi212	8.97e-01	3.5e-01		PCI/GDRY	07/08/2003
Bi214 *	9.02e-01	8.9e-02		PCI/GDRY	07/08/2003
Co60	ND		5.6e-02	PCI/GDRY	07/08/2003
Cs137	ND		5.4e-02	PCI/GDRY	07/08/2003
I131	ND		4.9e+01	PCI/GDRY	07/08/2003
K40	1.34e+01	9.8e-01		PCI/GDRY	07/08/2003
Pb210	ND		3.4e+00	PCI/GDRY	07/08/2003
Pb212	9.23e-01	8.7e-02		PCI/GDRY	07/08/2003
Pb214 *	1.08e+00	9.0e-02		PCI/GDRY	07/08/2003
Ra223 *	2.62e-01	1.6e-01		PCI/GDRY	07/08/2003
Ra224	1.11e+00	9.2e-01		PCI/GDRY	07/08/2003
Ra226 *	2.37e+00	6.1e-01		PCI/GDRY	07/08/2003
Ra228	1.13e+00	1.3e-01		PCI/GDRY	07/08/2003
Tl208	3.87e-01	5.1e-02		PCI/GDRY	07/08/2003
U235 *	1.49e-01	3.9e-02		PCI/GDRY	07/08/2003

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02908Z	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008749B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.710e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/29/2004 23:53	300.0	GE14	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.2e+02	PCI/GDRY	08/27/2003
Bi212	9.82e-01	4.2e-01		PCI/GDRY	08/27/2003
Bi214 *	1.31e+00	1.1e-01		PCI/GDRY	08/27/2003
Co60	ND		6.4e-02	PCI/GDRY	08/27/2003
Cs137	ND		6.8e-02	PCI/GDRY	08/27/2003
I131	ND		6.0e+01	PCI/GDRY	08/27/2003
K40	1.11e+01	9.0e-01		PCI/GDRY	08/27/2003
Pb210	ND		4.4e+00	PCI/GDRY	08/27/2003
Pb212	1.22e+00	1.0e-01		PCI/GDRY	08/27/2003
Pb214 *	1.58e+00	1.2e-01		PCI/GDRY	08/27/2003
Ra223 *	1.46e-01	1.6e-01		PCI/GDRY	08/27/2003
Ra224	1.67e+00	9.6e-01		PCI/GDRY	08/27/2003
Ra226 *	2.88e+00	7.7e-01		PCI/GDRY	08/27/2003
Ra228	1.52e+00	1.5e-01		PCI/GDRY	08/27/2003
Tl208	4.98e-01	6.3e-02		PCI/GDRY	08/27/2003

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02909A	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008749B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.980e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/29/2004 16:31	1000.0	GE05	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.6e+02	PCI/GDRY	08/27/2003
Bi212	1.30e+00	3.9e-01		PCI/GDRY	08/27/2003
Bi214 *	1.69e+00	1.3e-01		PCI/GDRY	08/27/2003
Co60	ND		8.4e-02	PCI/GDRY	08/27/2003
Cs137	ND		5.8e-02	PCI/GDRY	08/27/2003
I131	ND		4.2e+01	PCI/GDRY	08/27/2003
K40	2.15e+01	1.5e+00		PCI/GDRY	08/27/2003
Pb210	ND		3.8e+00	PCI/GDRY	08/27/2003
Pb212	1.25e+00	9.7e-02		PCI/GDRY	08/27/2003
Pb214 *	1.73e+00	1.2e-01		PCI/GDRY	08/27/2003
Ra223 *	4.36e-01	1.1e-01		PCI/GDRY	08/27/2003
Ra224	1.48e+00	9.9e-01		PCI/GDRY	08/27/2003
Ra226 *	3.77e+00	6.3e-01		PCI/GDRY	08/27/2003
Ra228	1.45e+00	1.6e-01		PCI/GDRY	08/27/2003
Th234 *	7.90e-01	4.1e-01		PCI/GDRY	08/27/2003
Tl208	4.79e-01	6.1e-02		PCI/GDRY	08/27/2003
U235 *	2.36e-01	3.9e-02		PCI/GDRY	08/27/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02910T	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008749B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.810e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/29/2004 16:31	1000.0	GE06	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.5e+02	PCI/GDRY	08/27/2003
Bi212	9.29e-01	3.3e-01		PCI/GDRY	08/27/2003
Bi214 *	1.78e+00	1.3e-01		PCI/GDRY	08/27/2003
Co60	ND		6.8e-02	PCI/GDRY	08/27/2003
Cs137	1.13e-01	3.1e-02		PCI/GDRY	08/27/2003
I131	ND		3.7e+01	PCI/GDRY	08/27/2003
K40	1.07e+01	8.4e-01		PCI/GDRY	08/27/2003
Pb210	ND		3.9e+00	PCI/GDRY	08/27/2003
Pb212	8.13e-01	7.4e-02		PCI/GDRY	08/27/2003
Pb214 *	1.88e+00	1.3e-01		PCI/GDRY	08/27/2003
Ra223 *	3.74e-01	1.1e-01		PCI/GDRY	08/27/2003
Ra224	4.34e-01	7.0e-01		PCI/GDRY	08/27/2003
Ra226 *	3.34e+00	6.0e-01		PCI/GDRY	08/27/2003
Ra228	9.31e-01	1.1e-01		PCI/GDRY	08/27/2003
Th234 *	2.30e+00	4.5e-01		PCI/GDRY	08/27/2003
Tl208	3.01e-01	4.7e-02		PCI/GDRY	08/27/2003
U235 *	2.03e-01	3.6e-02		PCI/GDRY	08/27/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02911U	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008749B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.580e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/29/2004 16:31	1000.0	GE07	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.4e+02	PCI/GDRY	11/11/2003
Bi212	7.27e-01	3.8e-01		PCI/GDRY	11/11/2003
Bi214 *	7.48e-01	8.0e-02		PCI/GDRY	11/11/2003
Co60	ND		5.9e-02	PCI/GDRY	11/11/2003
Cs137	ND		4.4e-02	PCI/GDRY	11/11/2003
I131	ND		3.7e+01	PCI/GDRY	11/11/2003
K40	1.41e+01	1.0e+00		PCI/GDRY	11/11/2003
Pb210	ND		1.7e+01	PCI/GDRY	11/11/2003
Pb212	5.89e-01	6.5e-02		PCI/GDRY	11/11/2003
Pb214 *	8.23e-01	7.6e-02		PCI/GDRY	11/11/2003
Ra223 *	2.12e-01	1.3e-01		PCI/GDRY	11/11/2003
Ra224	7.16e-01	7.2e-01		PCI/GDRY	11/11/2003
Ra226 *	1.43e+00	5.4e-01		PCI/GDRY	11/11/2003
Ra228	7.09e-01	1.1e-01		PCI/GDRY	11/11/2003
Th234 *	1.36e+00	4.9e-01		PCI/GDRY	11/11/2003
Tl208	2.22e-01	4.3e-02		PCI/GDRY	11/11/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02912V	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008749B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.930e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/29/2004 16:31	1000.0	GE09	RCL

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND			PCI/GDRY	11/11/2003
Bi212	1.95e+00	3.9e-01		PCI/GDRY	11/11/2003
Bi214 *	8.95e-01	8.6e-02		PCI/GDRY	11/11/2003
Co60	ND		6.6e-02	PCI/GDRY	11/11/2003
Cs137	ND		5.6e-02	PCI/GDRY	11/11/2003
I131	ND		4.0e+01	PCI/GDRY	11/11/2003
K40	1.33e+01	9.8e-01		PCI/GDRY	11/11/2003
Pb210	ND		6.1e+00	PCI/GDRY	11/11/2003
Pb212	1.99e+00	1.3e-01		PCI/GDRY	11/11/2003
Pb214 *	9.98e-01	8.5e-02		PCI/GDRY	11/11/2003
Ra223 *	5.05e-01	1.3e-01		PCI/GDRY	11/11/2003
Ra224	2.24e+00	8.4e-01		PCI/GDRY	11/11/2003
Ra226 *	2.03e+00	5.6e-01		PCI/GDRY	11/11/2003
Ra228	2.29e+00	1.8e-01		PCI/GDRY	11/11/2003
Th234 *	2.37e+00	5.6e-01		PCI/GDRY	11/11/2003
Tl208	7.47e-01	6.6e-02		PCI/GDRY	11/11/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02913W	QC batch #:	0003293H
Matrix:	SOIL	Prep batch #:	0008749B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.900e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
06/29/2004 16:31	1000.0	GE10	RCL

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		1.6e+02	PCI/GDRY	11/11/2003
Bi212	1.62e+00	3.5e-01		PCI/GDRY	11/11/2003
Bi214 *	1.37e+00	1.1e-01		PCI/GDRY	11/11/2003
Co60	ND		6.1e-02	PCI/GDRY	11/11/2003
Cs137	ND		5.3e-02	PCI/GDRY	11/11/2003
I131	ND		3.8e+01	PCI/GDRY	11/11/2003
K40	1.35e+01	9.6e-01		PCI/GDRY	11/11/2003
Pb210	ND		2.8e+00	PCI/GDRY	11/11/2003
Pb212	1.40e+00	9.9e-02		PCI/GDRY	11/11/2003
Pb214 *	1.54e+00	1.1e-01		PCI/GDRY	11/11/2003
Ra223 *	3.63e-01	9.7e-02		PCI/GDRY	11/11/2003
Ra224	1.40e+00	5.8e-01		PCI/GDRY	11/11/2003
Ra226 *	3.35e+00	5.1e-01		PCI/GDRY	11/11/2003
Ra228	1.52e+00	1.4e-01		PCI/GDRY	11/11/2003
Th234 *	9.23e-01	4.3e-01		PCI/GDRY	11/11/2003
Tl208	5.42e-01	5.2e-02		PCI/GDRY	11/11/2003
U235 *	2.04e-01	3.1e-02		PCI/GDRY	11/11/2003

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400032**

QC BATCH SUMMARY

QC batch #: 0003293H
Preparation procedure: N/A
Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	± 2σ Uncertainty (%)	Analyst
A4.02897P		N/A		RCL
A4.02898Q		N/A		RCL
A4.02899R		N/A		RCL
A4.02900Q		N/A		RCL
A4.02900Q	DUP	N/A		RCL
A4.02901R		N/A		RCL
A4.02902T		N/A		RCL
A4.02903U		N/A		RCL
A4.02904V		N/A		RCL
A4.02905W		N/A		RCL
A4.02906X		N/A		RCL
A4.02907Y		N/A		RCL
A4.02908Z		N/A		RCL
A4.02909A		N/A		RCL
A4.02910T		N/A		RCL
A4.02911U		N/A		RCL
A4.02912V		N/A		RCL
A4.02913W		N/A		RCL

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

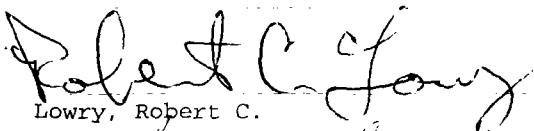
QC Batch #: 0003293H

Analytical Procedure: NAREL GAM-01

LABORATORY DUPLICATES (PCI/GDRY)

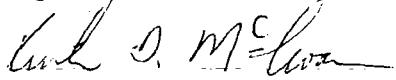
Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z	
A4.02900Q	BA140					
A4.02900Q	BI212	9.21e-01 \pm 3.5e-01	1.12e+00 \pm 2.5e-01	19.50	0.87	OK
A4.02900Q	CO60					
A4.02900Q	CS137					
A4.02900Q	I131					
A4.02900Q	K40	1.20e+01 \pm 8.7e-01	1.16e+01 \pm 8.3e-01	3.39	-0.39	OK
A4.02900Q	PB210					
A4.02900Q	PB212	8.51e-01 \pm 7.2e-02	9.18e-01 \pm 6.9e-02	7.57	0.84	OK
A4.02900Q	RA224	9.85e-01 \pm 8.1e-01	1.61e+00 \pm 6.1e-01	48.17	1.21	OK
A4.02900Q	RA228	9.59e-01 \pm 1.1e-01	9.21e-01 \pm 1.0e-01	4.04	-0.37	OK
A4.02900Q	TL208	3.75e-01 \pm 5.0e-02	4.21e-01 \pm 4.7e-02	11.56	1.04	OK

Analyst:


Lowry, Robert C.

6-30-04

QA Officer:


Linda J. McLean

7/6/04

Request Made By:	Fred Micke	Request Date: May 18, 2004
Title:	On-Scene Coordinator	
Office:	USEPA, Region 5, Section #3, Emergency Response Branch	
Address:	77 W. Jackson Blvd; SE-5J	
Address:	Chicago, IL 60604	
Phone:	312-886-5123	FAX: 312-353-9176
E-mail:	micke.fredrick@epa.gov	

NAREL CLASSIFICATIONS AND APPROVALS
For laboratory use only

NAREL Project Name and Prefix: Lindsay Light II

S5L2

Title	Signature	Date
NAREL Project Manager	<u>Donya B. Hudson</u>	<u>5/19/04</u>
Radiation Safety Officer	<u>Randy M. Jendron</u>	<u>5/24/2004</u>
Safety, Health & Environmental Manager	<u>Randy M. Jendron</u>	<u>5/24/2004</u>
Hazardous Waste Officer	<u>Randy M. Jendron for Zeola Smith</u>	<u>5/24/2004</u>
Quality Assurance Coordinator	<u>Mary Wisdom</u>	<u>5/25/04</u>
Sample Preparation Manager	<u>Susan M Baker</u>	<u>5/19/04</u>
Counting Room Manager	<u>David P. Saunderson</u>	<u>5/19/04</u>
Radioanalytical Project Manager	<u>Donya B. Hudson</u>	<u>5/19/04</u>
Mixed Waste Analytical Program Manager		
Other		
MASB Chief	<u>John Dugan</u>	<u>5/25/04</u>
NAREL Director	<u>Michael</u>	<u>05/25/04</u>

PROJECT DESCRIPTION

Include all necessary information. Attach any pertinent historical information about the site such as reports, laboratory analytical results, process information.

Site Name: Lindsay Light II-Lake Shore East

Site Location (Region, State, City): Region 5, IL, Chicago

EPA Facility ID: 2004 T 05F 302DC6C 05YTBB05 (Account #) And/or CERCLIS ID Number: _____

Description of Site Program Type: Superfund Removal Action

Please check all that are applicable.

- Federal Facility Superfund NPL Superfund Remedial Superfund Removal
 RCRA Corrective Action State Site BRAC Site FUSRAP NRC Reactor
 Brownsfield SDMP Other (Specify) _____

Is This a Federal Facility? Yes X No

Site History and Relationship to Samples: Former rail yard, low level radiation onsite. Site is being cleaned up as a Superfund removal action.

(Example: Site was used as a disposal facility for Uranium and TCE. Samples are being used for the Preliminary Assessment of Operable Unit 1.)

The soil samples are for verification used to indicate that areas have been properly cleaned up. Total radium (R-226 and R-228) should be < 7.1 pCi/g if the cleanup has been done properly.

Handling Precautions:

Known or Suspected Hazards: Low level radiation

Radiochemicals: Radium 226 and 228

Hazardous Chemicals: None

Biohazards: None

Please contact the NAREL Project Manager to discuss the details of your analytical request.

ANALYTICAL REQUEST							
Number of Samples and Matrices:	Soil 20+/-	Sediment	Water	Air Filter	Tissue	Other	
Analyses Requested (See Attachment 1-4 for a list of Analytes)							
Gamma Spectroscopy	X <input type="checkbox"/>	Uranium	X <input type="checkbox"/>	Radium-226	X <input type="checkbox"/>	Volatiles	<input type="checkbox"/>
Gross Alpha/Beta	<input type="checkbox"/>	Thorium	X <input type="checkbox"/>	Radium-228	X <input type="checkbox"/>	Semi-Volatiles	<input type="checkbox"/>
Tritium	<input type="checkbox"/>	Plutonium	<input type="checkbox"/>	Metals	<input type="checkbox"/>	PAH/PNA	<input type="checkbox"/>
Iodine-131	<input type="checkbox"/>	Americium	<input type="checkbox"/>	Mercury	<input type="checkbox"/>	Pesticides	<input type="checkbox"/>
Strontium	<input type="checkbox"/>					PCBs	<input type="checkbox"/>
Other :							
Sample Collection / Preparation: See Attachment 5-6 for Sample Collection Information		Yes	No	Comments			
Filter sample in field		<input type="checkbox"/>	<input type="checkbox"/>				
Filter sample at NAREL		<input type="checkbox"/>	<input type="checkbox"/>				
Adjust pH		<input type="checkbox"/>	<input type="checkbox"/>				
Separate liquid phases		<input type="checkbox"/>	<input type="checkbox"/>				
Remove foreign material (rocks, sticks, leaves)		<input type="checkbox"/>	<input type="checkbox"/>				
Decant liquids from solids		<input type="checkbox"/>	<input type="checkbox"/>				
Analyze samples wet		<input type="checkbox"/>	<input type="checkbox"/>				
Requested Turnaround Time:		Standard X <input type="checkbox"/>	Other <input type="checkbox"/> (Please Specify)				
Expected Sampling Date: Samples have already been collected.							
Shipment Date (ETA at NAREL): May 25, 2004 or later See Attachment 5-6 for Sample Shipping Guidelines							

QUALITY ASSURANCE REQUIREMENTS / INFORMATION	
Does this project have a QA Plan? Yes <input type="checkbox"/> No X <input checked="" type="checkbox"/> If yes, a copy is required by NAREL.	
Standard QA/QC analyses at NAREL are performed on batches of up to 20 samples of the same matrix. The QA/QC analyses include: For Gross Alpha/Beta and Gamma Spectrometry - 1 duplicate per batch For Isotopic radiochemical analyses - 1 method blank, 1 duplicate, 1 matrix spike, and 1 matrix spike duplicate per batch For Metals analyses - 1 method blank per digestion day, and 1 matrix spike, 1 matrix spike duplicate, and 1 duplicate per batch For Extractable Organics - 1 method blank per extraction day, and 1 matrix spike, and 1 matrix spike duplicate per batch For Volatile Organics - 1 method blank per analytical sequence, and 1 matrix spike, and 1 matrix spike duplicate per batch	
Please list any other QA/QC requirements below:	
Specific Method Requirements:	

DATA REPORTING

Data Reporting Requirements: Standard Other (Please Specify)
(See Attachment 1-4 for Standard Data Reporting Information)

Send Report To:	Fred Micke	
Title:	On-Scene Coordinator	
Office:	USEPA, Region 5, Emergency Response Branch	
Address:	77 W. Jackson Blvd.; SE-5J	
Address:	Chicago, IL 60604	
Phone:	312-886-5123	FAX: 312-353-9176
E-mail:	micke.fredrick@epa.gov	

If NAREL is unable to arrange for waste disposal at a minimal cost, any sample remaining after analysis will be returned 180 days after the final report is issued.

Name and address for return of sample:

Name and Title:	Mr. Joseph Weiss
Office:	Superfund Warehouse
Address:	600A Joliet Rd.
City, State, Zip Code:	Willowbrook, IL 60527
Phone:	630-481-5000

ATTACHMENT 1 of 6

There are three levels of report deliverables available from NAREL:

Level 1 Report - includes sample and QC results

Level 2 Report - includes sample and QC results, and instrument calibration information

Level 3 Report - includes sample and QC results, and instrument calibration information, and analytical raw data

Standard MDCs and reporting limits are listed in the tables below. MDCs and Reporting Limits depend on a number of variables including sample size, counting times, instrument backgrounds, matrix interferences, dilutions, etc. The actual MDC and Reporting Limit for each sample will be different from those listed below based on each of these variables.

RADIOCHEMICAL MDCs								
Analysis Type	Drinking Water Aliquot Size	Drinking Water MDC	Water (other) Aliquot Size	Water (other) MDC	Solids Aliquot Size	Solids MDC	Air Aliquot Size	Air MDC
Gross Alpha	500 mL	1.8 pCi/L	200 mL	4.4 pCi/L	0.1 g	8.7 pCi/g		
Gross Beta	500 mL	1.4 pCi/L	200 mL	3.5 pCi/L	0.1 g	7 pCi/g	2500 m ³	0.0015 pCi/m ³
Radium-226			1 L	0.02 pCi/L	0.5 g	0.04 pCi/g		
Radium-228			1 L	1 pCi/L	0.5 g	2 pCi/g		
Iodine-131			2 L	0.7 pCi/L				
Strontium-89			2 L	1 pCi/L	0.5 g	4 pCi/g		
Strontium-90			2 L	1 pCi/L	0.5 g	4 pCi/g		
Uranium-234, 235, 238			1 L	0.1 pCi/L	0.5 g	0.2 pCi/g	50000 m ³	2 pCi/m ³
Thorium-230, 232			1 L	0.2 pCi/L	0.5 g	0.35 pCi/g		
Plutonium-238, 239			1 L	0.15 pCi/L	0.5 g	0.3 pCi/g		
Amencium-241			10 mL	0.1 nCi/L				
Thorium-227								
Thonum-228								
Tritium								

Inorganic Metals Reporting Limits					
Analyte	Water Reporting Limit	Soil / Sediment Reporting Limit	Analyte	Water Reporting Limit	Soil / Sediment Reporting Limit
Aluminum	200 µg/L	20 mg/kg	Magnesium	5000 µg/L	500 mg/kg
Antimony	60 µg/L	6 mg/kg	Manganese	15 µg/L	1.5 mg/kg
Arsenic	10 µg/L	1 mg/kg	Mercury	0.2 µg/L	0.1 mg/kg
Banum	200 µg/L	20 mg/kg	Nickel	40 µg/L	4 mg/kg
Beryllium	5 µg/L	0.5 mg/kg	Potassium	5000 µg/L	500 mg/kg
Cadmum	5 µg/L	0.5 mg/kg	Selenium	5 µg/L	0.5 mg/kg
Calcium	5000 µg/L	500 mg/kg	Silver	10 µg/L	1 mg/kg
Chromium	10 µg/L	1 mg/kg	Sodium	5000 µg/L	500 mg/kg
Cobalt	50 µg/L	5 mg/kg	Thallium	10 µg/L	1 mg/kg
Copper	25 µg/L	2.5 mg/kg	Vanadium	50 µg/L	5 mg/kg
Iron	100 µg/L	10 mg/kg	Zinc	20 µg/L	2 mg/kg
Lead	3 µg/L	0.3 mg/kg			

ATTACHMENT 2 of 6

Standard MDCs and reporting limits are listed in the tables below. MDCs and Reporting Limits depend on a number of variables including sample size, counting times, matrix interferences, etc. The actual MDC for each sample will be different from those listed below based on each of these variables.

Volatile Organics Reporting Limits					
Analyte	Water Reporting Limit	Soil / Sediment Reporting Limit	Analyte	Water Reporting Limit	Soil / Sediment Reporting Limit
Acetone	10 µg/L	10 µg/kg	1,3-Dichloropropane	5 µg/L	5 µg/kg
Benzene	5 µg/L	5 µg/kg	2,2-Dichloropropane	5 µg/L	5 µg/kg
Bromobenzene	5 µg/L	5 µg/kg	cis-1,3-Dichloropropene	5 µg/L	5 µg/kg
Bromoform	5 µg/L	5 µg/kg	trans-1,3-Dichloropropene	5 µg/L	5 µg/kg
Bromochloromethane	5 µg/L	5 µg/kg	1,1-Dichloropropene	5 µg/L	5 µg/kg
Bromodichloromethane	5 µg/L	5 µg/kg	Ethylbenzene	5 µg/L	5 µg/kg
Bromomethane	5 µg/L	5 µg/kg	Hexachlorobutadiene	5 µg/L	5 µg/kg
2-Butanone	10 µg/L	10 µg/kg	2-Hexanone	10 µg/L	10 µg/kg
n-Butylbenzene	5 µg/L	5 µg/kg	Isopropylbenzene	5 µg/L	5 µg/kg
sec-Butylbenzene	5 µg/L	5 µg/kg	p-Isopropyltoluene	5 µg/L	5 µg/kg
tert-Butylbenzene	5 µg/L	5 µg/kg	Methylene chloride	5 µg/L	5 µg/kg
Carbon disulfide	5 µg/L	5 µg/kg	4-Methyl-2-pentanone	10 µg/L	10 µg/kg
Carbon tetrachloride	5 µg/L	5 µg/kg	Naphthalene	5 µg/L	5 µg/kg
Chlorobenzene	5 µg/L	5 µg/kg	n-Propylbenzene	5 µg/L	5 µg/kg
Chlorodibromomethane	5 µg/L	5 µg/kg	Styrene	5 µg/L	5 µg/kg
Chloroethane	5 µg/L	5 µg/kg	1,1,1,2-Tetrachloroethane	5 µg/L	5 µg/kg
Chloroform	5 µg/L	5 µg/kg	1,1,2,2-Tetrachloroethane	5 µg/L	5 µg/kg
Chloromethane	5 µg/L	5 µg/kg	Tetrachloroethene	5 µg/L	5 µg/kg
2-Chlorotoluene	5 µg/L	5 µg/kg	Toluene	5 µg/L	5 µg/kg
4-Chlorotoluene	5 µg/L	5 µg/kg	1,2,3-Trichlorobenzene	5 µg/L	5 µg/kg
1,2-Dibromo-3-chloropropane	5 µg/L	5 µg/kg	1,2,4-Trichlorobenzene	5 µg/L	5 µg/kg
1,2-Dibromoethane	5 µg/L	5 µg/kg	1,1,1-Trichloroethane	5 µg/L	5 µg/kg
Dibromomethane	5 µg/L	5 µg/kg	1,1,2-Trichloroethane	5 µg/L	5 µg/kg
1,2-Dichlorobenzene	5 µg/L	5 µg/kg	Trichloroethene	5 µg/L	5 µg/kg
1,3-Dichlorobenzene	5 µg/L	5 µg/kg	Trichlorofluoromethane	5 µg/L	5 µg/kg
1,4-Dichlorobenzene	5 µg/L	5 µg/kg	1,2,3-Trichloropropane	5 µg/L	5 µg/kg
Dichlorodifluoromethane	5 µg/L	5 µg/kg	1,2,4-Trimethylbenzene	5 µg/L	5 µg/kg
1,1-Dichloroethane	5 µg/L	5 µg/kg	1,3,5-Trimethylbenzene	5 µg/L	5 µg/kg
1,2-Dichloroethane	5 µg/L	5 µg/kg	Vinyl chloride	5 µg/L	5 µg/kg
1,1-Dichloroethene	5 µg/L	5 µg/kg	m&p-Xylene	5 µg/L	5 µg/kg
Cis-1,2-Dichloroethene	5 µg/L	5 µg/kg	o-Xylene	5 µg/L	5 µg/kg
trans-1,2-Dichloroethene	5 µg/L	5 µg/kg	Total Xylenes	10 µg/L	10 µg/kg
1,2-Dichloropropane	5 µg/L	5 µg/kg			

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Standard MDCs and reporting limits are listed in the tables below. MDCs and Reporting Limits depend on a number of variables including sample size, counting times, matrix interferences, etc. The actual MDC for each sample will be different from those listed below based on each of these variables.

Semi-Volatile Organics Reporting Limits					
Analyte	Water Reporting Limit	Soil / Sediment Reporting Limit	Analyte	Water Reporting Limit	Soil / Sediment Reporting Limit
Phenol	10 µg/L	330 µg/kg	Acenaphthene	10 µg/L	330 µg/kg
bis(2-Chloroethyl)ether	10 µg/L	330 µg/kg	2,4-Dinitrophenol	25 µg/L	800 µg/kg
Chlorophenol	10 µg/L	330 µg/kg	4-Nitrophenol	25 µg/L	800 µg/kg
1,3-Dichlorobenzene	10 µg/L	330 µg/kg	Dibenzofuran	10 µg/L	330 µg/kg
1,4-Dichlorobenzene	10 µg/L	330 µg/kg	2,4-Dinitrotoluene	10 µg/L	330 µg/kg
1,2-Dichlorobenzene	10 µg/L	330 µg/kg	Diethylphthalate	10 µg/L	330 µg/kg
2-Methylphenol	10 µg/L	330 µg/kg	4-Chlorophenyl-phenylether	10 µg/L	330 µg/kg
2,2'-oxybis(1-Chloropropane)	10 µg/L	330 µg/kg	Fluorene	10 µg/L	330 µg/kg
4-Methylphenol	10 µg/L	330 µg/kg	4-Nitroaniline	25 µg/L	800 µg/kg
N-Nitroso-di-n-propylamine	10 µg/L	330 µg/kg	4,6-Dinitro-2-methylphenol	25 µg/L	800 µg/kg
Hexachloroethane	10 µg/L	330 µg/kg	N-Nitrosodiphenylamine (1)	10 µg/L	330 µg/kg
Nitrobenzene	10 µg/L	330 µg/kg	4-Bromophenyl-phenylether	10 µg/L	330 µg/kg
Isophorone	10 µg/L	330 µg/kg	Hexachlorobenzene	10 µg/L	330 µg/kg
2-Nitrophenol	10 µg/L	330 µg/kg	Pentachlorophenol	25 µg/L	800 µg/kg
2,4-Dimethylphenol	10 µg/L	330 µg/kg	Phenanthrene	10 µg/L	330 µg/kg
bis(2-Chloroethoxy)methane	10 µg/L	330 µg/kg	Anthracene	10 µg/L	330 µg/kg
2,4-Dichlorophenol	10 µg/L	330 µg/kg	Carbazole	10 µg/L	330 µg/kg
1,2,4-Trichlorobenzene	10 µg/L	330 µg/kg	Di-n-butylphthalate	10 µg/L	330 µg/kg
Naphthalene	10 µg/L	330 µg/kg	Fluoranthene	10 µg/L	330 µg/kg
4-Chloroaniline	10 µg/L	330 µg/kg	Pyrene	10 µg/L	330 µg/kg
Hexachlorobutadiene	10 µg/L	330 µg/kg	Butylbenzylphthalate	10 µg/L	330 µg/kg
4-Chloro-3-methylphenol	10 µg/L	330 µg/kg	3,3'-Dichlorobenzidine	10 µg/L	330 µg/kg
2-Methylnaphthalene	10 µg/L	330 µg/kg	Benzo(a)anthracene	10 µg/L	330 µg/kg
Hexachlorocyclopentadiene	10 µg/L	330 µg/kg	Chrysene	10 µg/L	330 µg/kg
2,4,6-Trichlorophenol	10 µg/L	330 µg/kg	bis(2-Ethylhexyl)phthalate	10 µg/L	330 µg/kg
2,4,5-Trichlorophenol	25 µg/L	800 µg/kg	Di-n-octylphthalate	10 µg/L	330 µg/kg
2-Chloronaphthalene	10 µg/L	330 µg/kg	Benzo(b)fluoranthene	10 µg/L	330 µg/kg
2-Nitroaniline	25 µg/L	800 µg/kg	Benzo(k)fluoranthene	10 µg/L	330 µg/kg
Dimethylphthalate	10 µg/L	330 µg/kg	Benzo(a)pyrene	10 µg/L	330 µg/kg
Acenaphthylene	10 µg/L	330 µg/kg	Indeno(1,2,3-cd)pyrene	10 µg/L	330 µg/kg
2,6-Dinitrotoluene	10 µg/L	330 µg/kg	Dibenz(a,h)anthracene	10 µg/L	330 µg/kg
3-Nitroaniline	25 µg/L	800 µg/kg	Benzo(g,h,i)perylene	10 µg/L	330 µg/kg

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Standard MDCs and reporting limits are listed in the tables below. MDCs and Reporting Limits depend on a number of variables including sample size, counting times, matrix interferences, etc. The actual MDC for each sample will be different from those listed below based on each of these variables.

Organochlorine Pesticide & PCB Reporting Limits					
Analyte	Water Reporting Limit	Soil / Sediment Reporting Limit	Analyte	Water Reporting Limit	Soil / Sediment Reporting Limit
alpha-BHC	0.05 µg/L	1.7 µg/kg	4,4'-DDT	0.10 µg/L	3.3 µg/kg
beta-BHC	0.05 µg/L	1.7 µg/kg	Methoxychlor	0.50 µg/L	17.0 µg/kg
delta-BHC	0.05 µg/L	1.7 µg/kg	Endrin ketone	0.10 µg/L	3.3 µg/kg
gamma-BHC (Lindane)	0.05 µg/L	1.7 µg/kg	Endrin aldehyde	0.10 µg/L	3.3 µg/kg
Heptachlor	0.05 µg/L	1.7 µg/kg	alpha-Chlordane	0.05 µg/L	1.7 µg/kg
Aldrin	0.05 µg/L	1.7 µg/kg	gamma-Chlordane	0.05 µg/L	1.7 µg/kg
Heptachlor epoxide	0.05 µg/L	1.7 µg/kg	Toxaphene	5.0 µg/L	170.0 µg/kg
Endosulfan I	0.05 µg/L	1.7 µg/kg	Aroclor 1016	1.0 µg/L	33.0 µg/kg
Dieldrin	0.10 µg/L	3.3 µg/kg	Aroclor 1221	2.0 µg/L	67.0 µg/kg
4,4'-DDE	0.10 µg/L	3.3 µg/kg	Aroclor 1232	1.0 µg/L	33.0 µg/kg
Endrin	0.10 µg/L	3.3 µg/kg	Aroclor 1242	1.0 µg/L	33.0 µg/kg
Endosulfan II	0.10 µg/L	3.3 µg/kg	Aroclor 1248	1.0 µg/L	33.0 µg/kg
4,4'-DDD	0.10 µg/L	3.3 µg/kg	Aroclor 1254	1.0 µg/L	33.0 µg/kg
Endosulfan sulfate	0.10 µg/L	3.3 µg/kg	Aroclor 1260	1.0 µg/L	33.0 µg/kg

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NAREL SAMPLE SHIPMENT GUIDELINES

This document provides guidance in the shipment of environmental samples to NAREL for radiochemical and/or mixed waste analyses.

All shipments must comply with the requirements of current DOT regulations. Refer to the DOT Hazardous Materials Regulations contained in Title 49 CFR Subtitle B, Chapter 1, Subchapter C, Parts 171 through 180.

Before collecting samples please refer to the attached table for requested sample sizes, containers and preservatives. For matrices not listed contact the NAREL Sample Preparation Manager at (334)270-7052.

Before shipping samples, notify the NAREL Sample Preparation Manager at (334)270-7052 and arrange for sample receipt and subsequent sample return 6 months after results have been reported.

When packing samples for shipment:

- Seal individual samples in plastic bags, preferably ziplock bags.
- Use the correct amount of absorbent material for the volume present.
Approved absorbent materials include vermiculite and cat litter.
- The temperature of samples requiring refrigeration during transport MUST be maintained at 4°C ± 2°C.
- Ice in a sealed plastic bag or reusable ice substitute freeze packs are acceptable cooling media.
- Chain of Custody forms MUST be sealed in a large ziplock bag and taped to the inside of the cooler lid.

After samples are packed for shipment, secure the cooler with tape and attach a custody seal across the seam of the cooler lid.

All samples MUST be shipped overnight to arrive Monday through Friday. No deliveries are accepted on weekends or Federal holidays.

Send all samples to:

**National Air and Radiation Environmental Laboratory
540 South Morris Avenue
Montgomery, Alabama 36115
Attention: Sample Preparation Manager**

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TABLE 1

SAMPLE COLLECTION AND ANALYSIS INFORMATION

Analysis	Water Samples				Soil / Sediment Samples			
	Collection Volume (mL)	Acceptable Containers	Preservative	Holding Times	Collection Volume (g)	Acceptable Containers	Preservative	Holding Times
Metals (except mercury)	600	Polyethylene or glass	HNO ₃ to pH <2	6 months from date of collection	200g	Polyethylene or glass	cool, 4°C ±2°C	6 months from date of collection
Mercury	400	Polyethylene or glass	HNO ₃ to pH <2	28 days from date of collection	200g	Polyethylene or glass	cool, 4°C ±2°C	28 days from date of collection
Volatile Organics	2 X 40 mL glass vials w/ Teflon lined caps filled with no headspace.	40 mL glass vials w/ Teflon lined caps	HCl to pH <2	14 days from date of collection	4 oz glass jar with Teflon lined cap filled with no headspace	4 oz glass jar with Teflon lined cap	cool, 4°C ±2°C	14 days from date of collection
Pesticides & PCBs	2000 mL	2 X 1L amber glass container with Teflon lined cap	cool, 4°C ±2°C	Samples extracted within 14 days of collection and extracts analyzed within 40 days following extraction	1 full 8 oz glass jar	8 oz glass jar with Teflon lined cap	cool, 4°C ±2°C	Samples extracted within 14 days of collection and extracts analyzed within 40 days following extraction
Tritium	200 mL	Glass w/ Teflon lined caps	None, NO ACID	NA				
Other Radiochemical Analyses	4 - L	Plastic or glass	HNO ₃ to pH <2	NA	2 - 5 Kg	Plastic or glass	None	NA